

SE1100

Relay Output Boards

User's Manual

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SE1100 User's Manual

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ABOUT THIS MANUAL

This manual provides instructions for designing a controller system that uses relay boards. Instructions are also provided for using Dynamic C[®] functions.

Assumptions

Assumptions are made regarding the user's knowledge and experience in the following areas:

- Ability to design and engineer the target system that is controlled by a controller with analog-to-digital conversion expansion boards.
- Understanding of the basics of operating a software program and editing files under Windows on a PC.
- Knowledge of the basics of C programming.



For a full treatment of C, refer to the following texts.

The C Programming Language by Kernighan and Ritchie
C: A Reference Manual by Harbison and Steel

- Knowledge of basic Z80 assembly language and architecture for controllers with a Z180 microprocessor.



For documentation from Zilog, refer to the following texts.

Z180 MPU User's Manual
Z180 Serial Communication Controllers
Z80 Microprocessor Family User's Manual

- Knowledge of basic architecture for controllers with a Rabbit 2000[™] processor.



For documentation from Rabbit Semiconductor, refer to the following texts.

Rabbit 2000[™] Microprocessor User's Manual
Rabbit 2000[™] Microprocessor Designer's Handbook

Acronyms

Table 1 lists and defines the acronyms that may be used in this manual.







Table 1. Acronyms

Acronym	Meaning
EPROM	Erasable Programmable Read-Only Memory
EEPROM	Electrically Erasable Programmable Read-Only Memory
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
NMI	Nonmaskable Interrupt
PIO	Parallel Input/Output Circuit (Individually Programmable Input/Output)
PRT	Programmable Reload Timer
RAM	Random Access Memory
RTC	Real-Time Clock
SIB	Serial Interface Board
SRAM	Static Random Access Memory
UART	Universal Asynchronous Receiver Transmitter

Icons

Table 2 displays and defines icons that may be used in this manual.

Table 2. Icons

Icon	Meaning	Icon	Meaning
	Refer to or see		Note
	Please contact	Tip	Tip
	Caution		High Voltage
	Factory Default		

Conventions

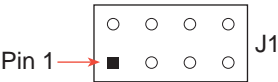
Table 3 lists and defines the typographical conventions that may be used in this manual.

Table 3. Typographical Conventions

Example	Description
while	Courier font (bold) indicates a program, a fragment of a program, or a Dynamic C keyword or phrase.
// IN-01...	Program comments are written in Courier font, plain face.
<i>Italics</i>	Indicates that something should be typed instead of the italicized words (e.g., in place of <i>filename</i> , type a file's name).
Edit	Sans serif font (bold) signifies a menu or menu selection.
...	An ellipsis indicates that (1) irrelevant program text is omitted for brevity or that (2) preceding program text may be repeated indefinitely.
[]	Brackets in a C function's definition or program segment indicate that the enclosed directive is optional.
< >	Angle brackets occasionally enclose classes of terms.
a b c	A vertical bar indicates that a choice should be made from among the items listed.

Pin Number 1

A black square indicates pin 1 of all headers.



Measurements

All diagram and graphic measurements are in inches followed by millimeters enclosed in parenthesis.



CHAPTER 1: OVERVIEW

Chapter 1 gives an overview of the SE1100 relay board and its specific features.

Z-World's SE1100 expansion boards provide a simple way to add relays to a control system built around a Z-World controller. These relay output boards can be connected to the digital outputs of any Z-World controller. The SE1100 adds expansion capability even to boards without a Z-World PLCBus interface.

The SE1100's four SPDT relays are high-power relays. The relays are optically isolated, and have fuses and filters to protect them from noise and transients. Each relay has an LED indicator to help with system maintenance.

Figure 1-1 illustrates a system of expansion boards mounted on a DIN rail and connected to a controller. Chapter 2, "Getting Started," provides instructions and illustrations for connecting the SE1100 relay board to a controller's digital outputs.

Features

The SE1100 relay board is designed to interface to the digital outputs of any Z-World controller. The board's four relays have a 6.3 A fuse connected to the common pin for overcurrent protection. In addition to the fuses, a snubber circuit across the common and the normally open/ normally closed pins suppresses voltage spikes across the contacts. All of the signals from the four SPDT relays are brought out to header J1.

The interface voltage has a range of 5 V to 24 V. A 24 V DC supply is needed to power the relays. When driving the relays with high-voltage drivers, an SE1100 can be located up to 15 m (50 feet) from the controller. The opto isolation between the controller and the relays provides an extra level of assurance to guard against noise from high-voltage transients.

The LEDs on the relay board indicate the status of the relays. When an LED is on, the relay associated with that LED is energized. When an LED is off, the relay is in a default state. The default state is for the common terminal to be connected to the normally closed terminal.

The onboard linear regulator provides the regulated +5 V to all the logic elements. The relays and the LEDs are driven with the unregulated DC input voltage. Altogether, the SE1100 draws approximately 80 mA from the DC power supply input when all the relays are turned on.

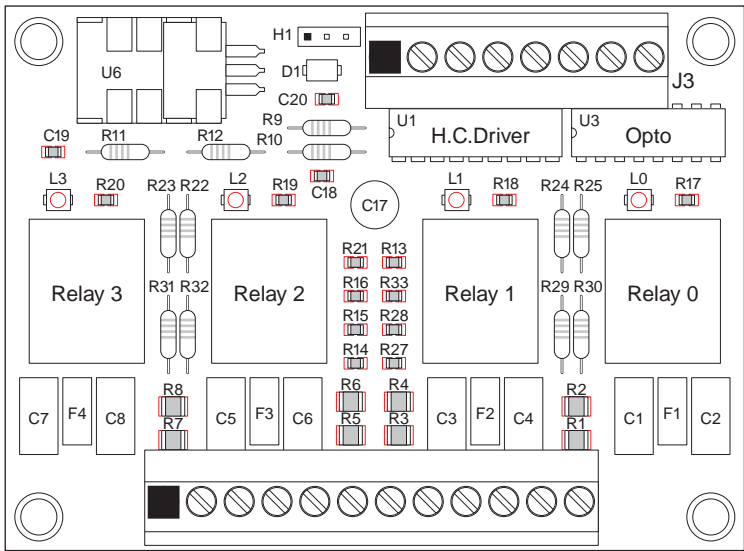


Figure 1-2. SE1100 Relay Expansion Board Layout



*CHAPTER 2: **GETTING STARTED***

Connecting an SE1100 to a Z-World Controller

Connect the SE1100 to the digital outputs of any Z-World controller through the quick-release connector J3.

Figure 2-1 shows the pinout.

The four relays are optically isolated from the digital outputs on the host controller. RET1 provides a return for REL0 and REL1; RET2 provides a return for REL2 and REL3.

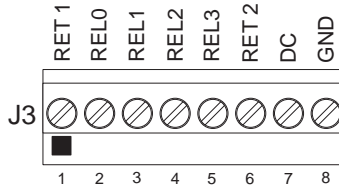


Figure 2-1. J3 Screw Terminal Addresses

High-Current Sinking Driver Connection

1. Wire RET1 and RET2 on J3 to K on the host controller.



K is connected to the +DC power supply on the host controller. K should not exceed 25 V.

2. Connect the four high-current outputs from the host controller to REL0, REL1, REL2, and REL3 on J3.
3. GND and DC on J3 may either be connected to a separate 24 V power supply, or they may be connected to GND and +DC on the host controller..

Figure 8-2 illustrates a typical SE1100 connection to a host controller with sinking high-current outputs.

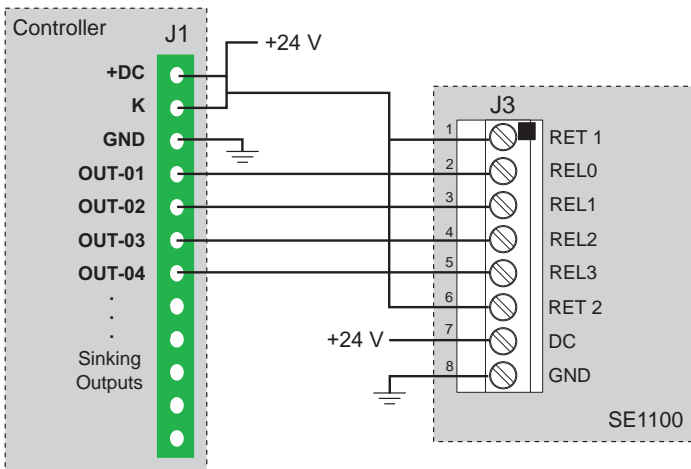


Figure 2-2. Connecting SE1100 to Controller with Sinking High-Current Outputs

High-Current Sourcing Drivers or TTL/CMOS Connection

1. Wire RET1 and RET2 on J3 to GND on the host controller.



K is connected to the +DC power supply on the host controller.
K should not exceed 25 V.

2. Connect the four high-current outputs or the TTL/CMOS outputs from the host controller to REL0, REL1, REL2, and REL3 on J3.
3. GND and DC on J3 may either be connected to a separate 24 V power supply, or they may be connected to GND and +DC on the host controller..

Figure 2-3 illustrates a typical SE1100 connection to a host controller with sourcing high-current outputs.

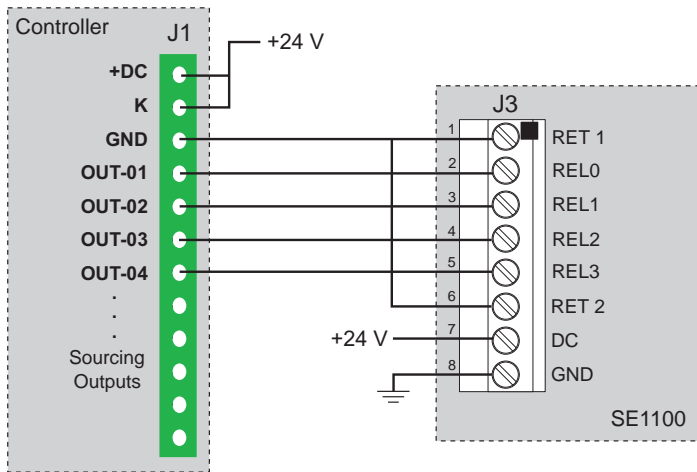


Figure 2-3. Connecting SE1100 to Controller with Sourcing High-Current Outputs

SE1100 Configuration

The SE1100 board holds four high-power relays. Each SE1100 relay has the following specifications:

- Standard coil voltage 24 V DC.
- Contact ratings:
10 A at 24 V DC
or 120 V AC,
7 A at 250 V AC resistive
maximum.

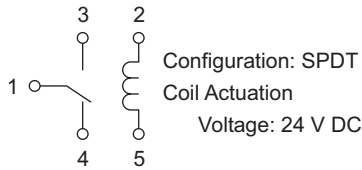


Figure 2-4. Relay Circuit

Pin 1 is the common. Pin 5 goes to a high-voltage/high-current driver on the relay board. Pin 2 is for the actuation voltage. Turning on the driver allows current to flow through the coil, switching on the relay. Pin 3 is the normally open contact. Pin 4 is the normally closed contact.

Each relay is protected by a 6.3 A fuse on pin 1. To help eliminate transients, a resistor/capacitor pair is attached between pin 1 and pin 3 on each relay. An LED is connected in line with the coil on each relay, and lights up when current passes through the coil.



Although the relays are rated at 10 A, they are protected with 6.3 A fuses because the size of the traces on the printed circuit boards limits the current through each relay to 6 A.

Header J1 is used to connect external devices to the relays.

Figure 2-5 illustrates the pinouts for the relay connection pins on header J1.

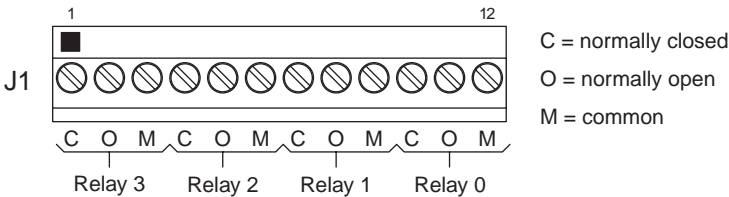


Figure 2-5. Relay Connection Pins



CHAPTER 3: SOFTWARE REFERENCE

There are no software drivers unique to the SE1100 expansion boards. Since the SE1100 is driven by the digital outputs of the host controller it is connected to, the drivers associated with the host controller's digital outputs will operate the relays on the SE1100.

The following sample program shows how to use the SE1100 with Z-World's BL1700 controller.

17SE1100.C

```
/* REL0 to U2, 0
   REL1 to U2, 1
   REL2 to U2, 2
   REL3 to U2, 3
   RET1 to RET2 to DC to BL1700, DCIN
   GND to U2, GND
*/

#include <vdriver.lib>
#include <eziobl17.lib>

main(){
    unsigned long t;
    VDInit();           // hits watchdog periodically
    eioBrdInit(0);      // initialize board
    while(1){
        t = MS_TIMER;
        printf("on\n");
        while((MS_TIMER - t) < 1000L){
            output(0x4100, 1);
            output(0x4100, 3);
            output(0x4100, 5);
            output(0x4100, 7);
        }
        t = MS_TIMER;
        printf("off\n");
        while((MS_TIMER - t) < 1000L){
            output(0x4100, 0);
            output(0x4100, 2);
            output(0x4100, 4);
            output(0x4100, 6);
        }
    }
}
```



*APPENDIX A: **SPECIFICATIONS***

SE1100 Relay Expansion Board

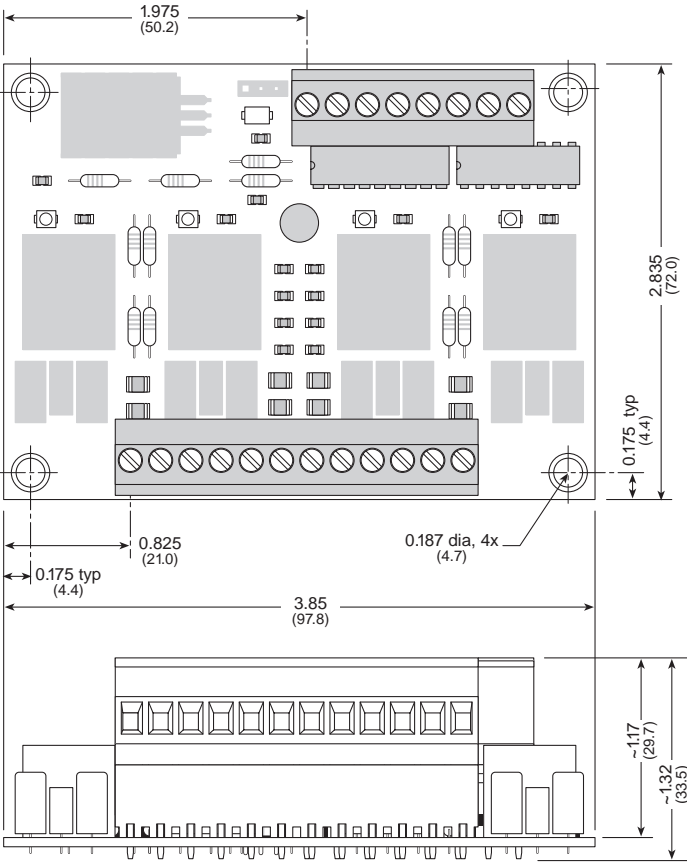


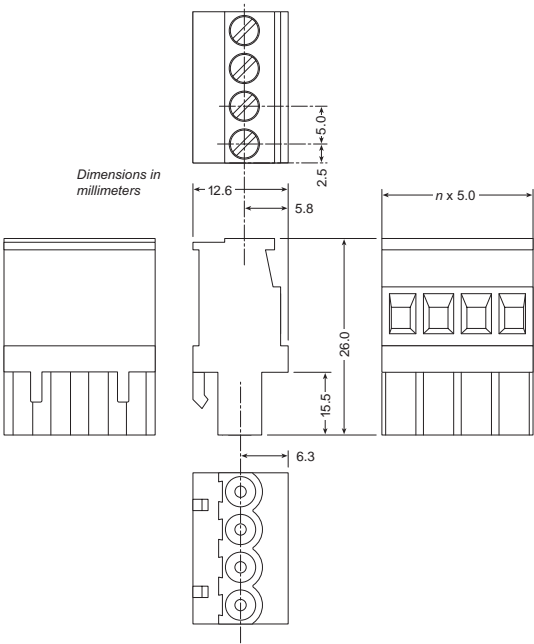
Figure A-1. SE1100 Dimensions

Table A-1. SE1100 Specifications

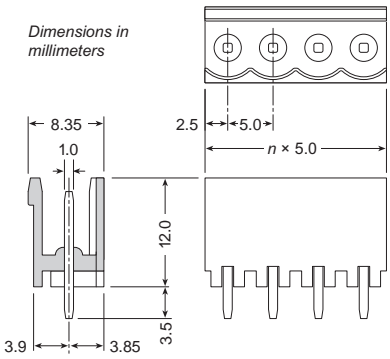
Feature	Specification
Board Size	2.835" × 3.85" × 1.32" (72.0 mm × 97.8 mm × 33.5 mm)
Operating Temperature	−40°C to +70°C
Humidity	5% to 95%, noncondensing
Input Voltage and Current	24 V DC, 80 mA
Relays	4 SPDT relays 6.3A at 250 V AC or 6.3A at 24 V DC

Quick-Release Connectors

The SE1100 comes equipped with quick-release connectors that allow for quick connection/disconnection. Figure A-2 illustrates the connectors and provides their dimensions. Table A-2 provides the specifications.



(a) Quick-Release Female Connector



(b) Quick-Release Male Connector

Figure A-2. Quick-Release Connectors

**Table A-2. Quick-Release Connectors
Specifications**

Feature	Specification
Maximum Voltage, Current	15 A @ 300 V
Insulation Resistance	100 GΩ
Wire	AWG #12–#26 stranded #14–#26 solid
Stripping Length	310 inches
Withdrawal Force	Meets UL 486
Torque	7 inches per pound

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